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Field Notes on Saw-Tooth Concrete Roof Construction, Windsor, Ontario

An interesting example of light concrete roof construction has just been completed at the new building for the Remington Arms-Union Metallic Cartridge Co., Windsor, Ont., Canada. The general construction of the building is the saw-tooth type, the slope of the separate roofs being 30°. There are nine sections, six of which are about 150′ long, and three 50′ long. The skeleton work of the building is of steel with the roof trusses carried on plate girders spanning columns about 50′ o. c.

The roof in general was constructed of 24-ga. Asbesto-steel,[1] covered by a smooth concrete slab about 1½″ thick, in which was embedded a wire mesh[2] of mild steel, the mesh being fastened to the bottom of each corrugation of the sheets by special clips, thus insuring the position of the wire at the bottom of the slab and giving a roof of maximum strength.

The steel sheets are of open-hearth steel covered on both sides with asphalt and white asbestos and present a very attractive appearance as an interior ceiling for the building. There was no necessity for plastering the under side. It is claimed that the asbestos covering and asphalt binder give a highly insulated roof. The corrugations of the sheets are about ¾″ deep and about 2⅜″ wide.[3]

The erection of the sheets was simple and required but two men to handle the material on the roof and a laborer on the ground who raised the sheets to the men and who also placed the clips for attaching the reinforcing mesh on the sheets before they were raised. Special purlin clips were furnished for fastening the sheets to the roof purlins in such a manner that the fasteners were not visible from the under side. In the same manner the sidelaps of the sheets were fastened to form a continuous joint in the corrugations and did not destroy the uniform appearance of the under side of the roofing sheets.

The erection of the roofing sheets was completed just about the same time as the brick parapet walls were carried up to the roof line and the concrete work started immediately. A serious problem of preventing this very thin slab of concrete from freezing had to be taken care of at this time, as the temperature was very low.

[1]Asbestos Protected Metal Co., Beaver Falls, Pa.

[2]Page Woven Wire Fence Co., Adrian, Mich.

[3]A detailed description of this material and some tests made with it will be found in the Jan., 1913, issue, p. 47.

EQUIPMENT AND PLANT ARRANGEMENT

A $\frac{1}{3}$-cu. yd. mixer[4] connected to a steam engine with a 10-h. p. boiler, was used for mixing all the concrete. Hot water was obtained from this boiler to wash the snow and ice from the sheets. A steam line was also run from this boiler to heat the sand pile. Three 1-in. pipes were carried under the sand pile, the pipes being perforated to allow the steam to escape. The steam pressure was kept up all night, a night watchman taking care of the fire, and the steam was allowed to escape into the sand pile all the time.

The mixer and the tower were located at about the center of the south wall. The tower was built of 2 x 4's spiked together to form 4-in. x 4-in. corner posts and 1-in. boards for braces. This tower was about 40′ high. The cage was made large enough to carry one wheelbarrow. A horse was used to raise the material. A counter-weight which was hung on the rope which passed over the sheaves on the top head frame and the bottom foot block assisted materially in decreasing the load the horse had to lift. A curious fact was that the horse had no difficulty in raising the load but seemed frightened when the cage was lowered, and the load of this cage pulled him back. A hook made of $\frac{1}{4}$-in. band iron hung from the head frame and was swung under the cage as it reached the top, thus taking the load away from the horse and insuring against danger while the full wheelbarrows were unloaded and the empty ones sent down.

A central runway about 5′ wide

FIG. 3.—A DETAILED VIEW SHOWING THE POSITION OF THE TOWER AND THE RUNWAY

At the right in the immediate foreground the asbestos steel sheathing has not been placed; at the left a ventilator obstructs the view of the tower

[4]T. L. Smith Co., Milwaukee

was constructed, crossing at right angles the stretches of saw-tooth gables, and the concrete was delivered to each section of the roof from this runway. Small triangular horses (which are shown in the sketches) were made on the ground, and these were used to support the plank runways. They were easily put in position and were shifted from one section of the roof as it was concreted to the next one with very little labor and loss of time. In fact, the concreting proceeded continuously without any necessity for stopping to shift the scaffold. The horses were made so that they hooked over the top purlin and the bottom end rested on the purlin below, thus taking all the load off the sheets and slab.

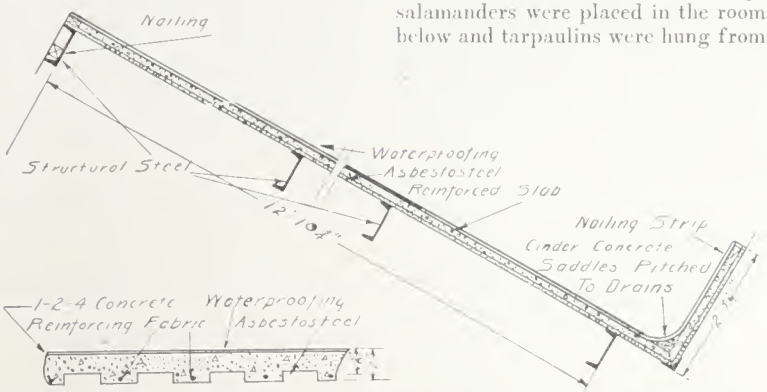


Fig. 4—Structural Details Showing the Arrangement of the Asbestos Steel, Concrete Slab, Structural Steel Purlins and Gutter Details

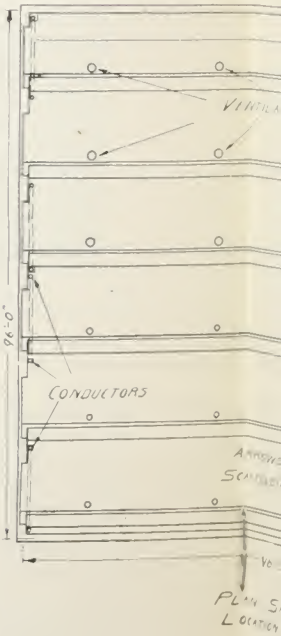
PLACING THE CONCRETE ROOF SLAB

In placing the concrete, screeds were nailed to the sheets about 8′ o. c., and these screeds were left in the concrete slab to serve as nailing strips for the waterproofing. Dry concrete was first placed in the gutters the entire length of the section and then the slab was poured and the gutter finished at the same time. On account of the steep pitch the consistency of the concrete was very dry. The surface was floated to a smooth finish.

As an added precaution against freezing the concrete was also protected after it was poured. Large salamanders were placed in the room below and tarpaulins were hung from the roof trusses to confine the heat at the portion of the roof at which the concrete was being poured. The ends of the saw-tooth sections were boarded up and all over the roof 1-in. boards were placed, on top of which were laid bags filled with manure. In this way the roof was protected against cold from all possible directions. The handling of the manure in this way proved very expeditious and also eliminated dirt and loss of material which would have resulted if the manure had been placed loose on the roof.

The ventilators shown on the building were bolted to the sheets

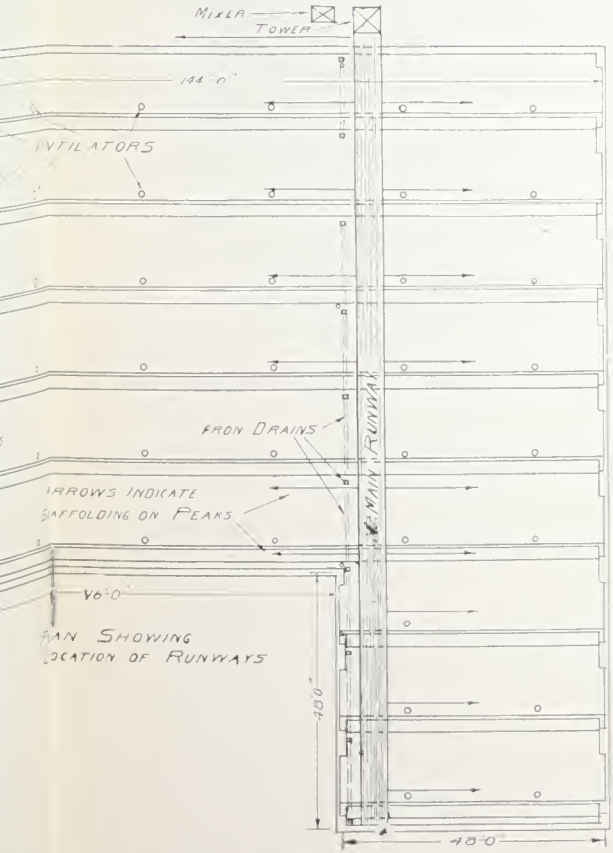
FIG. 1—GENERAL VIEW OF THE PLANT OF THE REMINGTON ARMS-UNION METALLIC CARTRIDGE CO., WINDSOR
This shows at the left the construction tower of the runway, crossing transversely the saw-tooth ridges



General View and Ground Plan of New Canadian Factory with Asbestosteel Saw-Tooth Roof Construction

...ng Co. Windsor, Ont.

...-tooth roofs



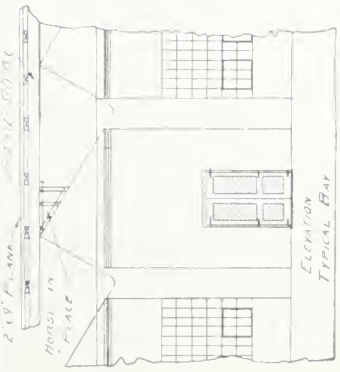


Fig. 2—General Plan of a Manufacturing Plant at Windsor, Ont.

This is a detailed elevation showing the layout of the saw-tooth roof, the position of the tower, the transverse runways and the lateral runways for each bay

FIG. 5—A DETAILED VIEW SHOWING TRIANGULAR HORSES FOR THE LATERAL RUNWAYS

This view shows in detail the ventilators and the mesh reinforcement used; the strips nailed along the horses are the screeds, ready to be placed; a ventilator is shown at the left

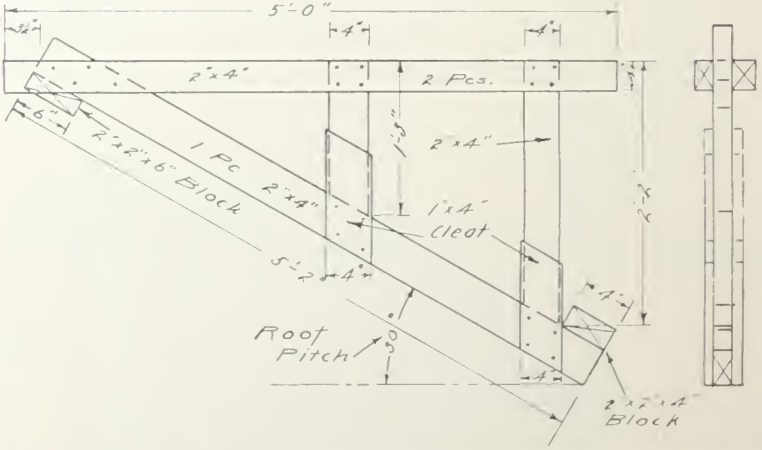


FIG. 6—DETAIL SHOWING THE CONSTRUCTION OF THE TRIANGULAR RUNWAY HORSES

Fig. 7—A Detailed View Showing Gutter Construction

In this view the man with a wheelbarrow has come out along the lateral runway and is shoveling a stiff mortar down the chute to the gutter. The man below is tamping and working this into place with a round-pointed shovel. It will be finished immediately by a finisher and covered with bags of manure

Fig. 8—Operating Views in Saw-tooth Roof Construction

Above is shown a finisher floating the incline slab. In this view he is working to a screed, which has been placed at the end gable. He works from a board to which cleats have been nailed and which keeps him from sliding down the incline. Below a view shows the gunny sacks full of manure ready for placing in the gutter

before the concrete was poured and the metal of the asbestos sheets cut out for the round openings at the same time the sheets were erected.

The work was interrupted several days on account of snow. However, by employing a large gang of laborers and cement finishers, the concrete was all poured within 8 das. after starting.

A standard built-up waterproofing[5]

[5]By the Canadian plant of Bird and Son, Hamilton, Ont.

was installed and the flashings at the parapet walls and at the ridges were the standard asbestos protected material used for flashing purposes.

All of the erection of sheets and placing of the concrete was performed by the Asbestos Protected Metal Co., Beaver Falls, Pa., under the supervision of Meyer Davis, this firm's engineer representative.

Asbestosteel (the steel sheathing described in the foregoing), in its various forms, ***Asbestosteel*** Lath for walls and partitions, the processes of manufacture and the machinery employed, are covered by the following patents in the United States of America:

April 3, 1906	Nov. 13, 1906	Sept. 5, 1911
April 24, 1906	Nov. 13, 1906	Sept. 5, 1911
June 12, 1906	Jan. 8, 1907	Sept. 5, 1911
April 8, 1913	July 29, 1913	Sept. 16, 1913
April 22, 1913	July 29, 1913	Sept. 16, 1913
July 29, 1913	July 29, 1913	Sept. 16, 1913
		Nov. 3, 1914

Other patents pending. Patents allowed and pending also in Canada, Mexico, Great Britain, Belgium, Germany, France and Austria.

The prices of ***Asbestosteel*** and fittings for fastening to the structure, the Company's literature, the services of its Engineering Department, or any information regarding ***Asbestosteel*** construction may be obtained by addressing the Company at any of its offices or agencies.

See back cover for list of Offices.

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APM . . Special Beaded Sheets
APM . . . Clapboard Siding
APM . . . . . Flat Sheets
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APM . . . Standard Louvres
APM . . . . Skylight Bars
APM Special Roofing Nails and Fasteners
APM Special Stucco Lath (for residences)
APM . Flexible Asbestos Shingles
APM . . . . Asbestos Tiles
APM . . Asbestos Roll Roofing
APM . Asbestos Building Papers
APM . . . Special Roof Paint
APM . . . . Roof Cements

Asbestos Protected Metal Co.
Beaver Falls, Pa.
Branch Offices or Agents in Principal Cities

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Asbestos Felt Works - - Waltham, Mass.

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Baltimore, Md.	Equitable Building
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Montreal, P. Q., Canada	Canadian Asbestos Company
Regina, Sask., Canada	Canadian Equipment and Supply Co.
Export Department	52 Broadway, New York.